

THE TENNESSEE STREAM MITIGATION PROGRAM



2005 STATUS REPORT

Reporting Period: February, 2003 through December 31, 2005



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Executive Summary

Since its inception in 2003, the Tennessee Stream Mitigation Program (TSMP) has made great strides to provide mitigation to offset stream impacts permitted through §404/401 of the *Clean Water Act*. The TSMP is committed to providing meaningful mitigation on degraded streams to improve in-stream and riparian habitat and overall water quality. Employing principles of natural channel design and process-based methodologies, the TSMP continues to identify and develop restoration and enhancement projects across the state.

As outlined in federal guidance and the Memorandum of Agreement under which the TSMP was established, basic program requirements include: fiscal management, project identification, project development, and project implementation. The TSMP is required to submit annual status reports to the US Army Corps of Engineers (USACE) and the Tennessee Department of Environment and Conservation (TDEC) as well as the Stream Mitigation Review Team (SMRT). At the request of the USACE, the format of these annual reports has been modified for public notice. As such, this report will provide detailed program information from February 2003 through December 31, 2005. Future reports will be submitted annually on April 1 in a similar format suitable for public notice.

Programmatic Accomplishments

The basic programmatic elements for implementing the program are in place. Programmatic accomplishments since 2003 include:

- The TSMP has hired additional personnel for a total staff of 5 employees.
- Generation of \$15,619,580.88 in fees and interest for payments associated with 114 water quality permits.
- Coordination with and development of strategic partnerships with federal and state agencies, non-profit organizations, and municipalities.
- Development of contractual agreements for design/construction services and legal instruments for perpetual protection of mitigation projects.
- Development of detailed project management guidance allowing for project identification, development, and implementation in one year.
- Development of Riparian Restoration Guidelines, Monitoring Protocol, and Project Success Criteria.

Project-Related Accomplishments

As of December 31, 2005, ten restoration/enhancement projects (Figure 1.) had been approved by the SMRT and were in some phase of development, implementation, or monitoring. These projects, located in eight different river basins (8-Digit HUC), will result in the restoration/enhancement and perpetual protection of approximately 105,393 linear feet stream generating approximately 40,656 stream mitigation credits.

The following projects were constructed prior to December 31, 2005: Turnbull Creek Enhancement Project (March 2005), Yanahli WMA Enhancement Project (March 2005), and Cole Creek Restoration Project (December 2005). These projects combine for a total of 27,756 linear feet of stream restoration and/or enhancement generating 7,172 mitigation credits. A more detailed description of all approved projects may be found later in this document.

The TSMP gives preference to potential projects on 303(d) listed streams, especially streams with impairment to physical habitat. Where possible, the TSMP develops projects to offset or mitigate for impairments such as habitat alteration from channelization, siltation due to excessive bank erosion, pathogens or organic enrichment from unrestricted livestock access, or nitrates from degraded riparian buffers. The TSMP strives to identify and develop projects that have the greatest ecological benefit and impact on water quality.

Of the ten SMRT approved TSMP projects, eight of these projects are located on 303(d) streams or in 303(d) watersheds. Approximately 82,813 linear feet or 79% of total linear feet of restoration/enhancement projects occur in 303(d) watersheds while 22,580 linear feet or 21% of the total linear feet occur in non-303(d) watersheds. These figures represent 33,782 mitigation credits or 83% of total mitigation credits while 6,874 mitigation credits or 17% of total mitigation credits were generated in non-303(d) watersheds. These statistics are represented graphically in Figure 2.

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Program History

In August 2002, the TSMP was established as Tennessee's first in-lieu-fee program. Administered by the Tennessee Wildlife Resources Foundation (TWRF), a 501c (3) non-profit, the TSMP is one mitigation alternative for impacts associated with §404/401 water quality permits. At the discretion of the USACE and TDEC, permittees may provide on-site or near site mitigation, purchase credits from a mitigation bank, or purchase mitigation through an established in-lieu-fee program. The TSMP accepts the responsibility for providing compensatory mitigation at the rate of \$200 per foot.

The TSMP's goal is to provide meaningful compensatory mitigation through the restoration and/or enhancement of degraded streams. By combining relatively small, incremental impacts within a geographic area, the TSMP can fund large-scale restoration/enhancement projects to improve in-stream and riparian habitat.

TSMP Partnerships

The TSMP has developed strategic partnerships with state and federal resources agencies, non-profit environmental organizations, and local municipalities to facilitate the identification, development, and implementation of mitigation projects. Through partnerships, the TSMP can provide funding for ongoing watershed initiatives through stream restoration. TSMP partners are important stakeholders with a vested interest in a project. Partners typically assist with landowner coordination/negotiation as well as community education and outreach. By partnering, the TSMP and other groups are able to leverage resources that enabled both organizations to achieve programmatic goals while producing results that benefited both the landowners and the environment.

TSMP Permitted Impacts Summary

As of December 31, 2005, the TSMP had accepted the mitigation responsibility for 114 permitted impacts (Figures 3 & 4.) totaling 74,898 linear feet. Of these, 96 or 84% of the permitted impacts represent transportation projects while the remaining 16% represent other types of projects. Stated another way, 68,636 linear feet or 91% of the linear feet of impacts were related to transportation projects while the remaining 6,262 linear feet were from other types of projects.

TSMP Financial Status

As of December 31, 2005, the TSMP trust fund ending balance was \$13,592,103.22. Since 2003, total receipts, including accrued interest earned, was \$15,619,580.88. Of this, total permitted impact receipts amounted to \$14,979,230.00 while total accrued interest equaled \$640,350.88. Total expenditures since 2003 were \$2,027,477.66 of which \$839,943.27 was

administrative expenditures while \$1,187,534.39 was project expenditures. A more detailed accounting of project expenditures is listed in Table 1.

Project Selection Process

A significant amount of time is allocated to project identification. In accordance with the MOA, the TSMP must evaluate impacts and identify suitable mitigation projects based upon the following criteria:

- Preference to the same Level III Ecoregion (Griffith, G.E., et.al., 1997), 6 digit HUC, or, ideally, same 8 digit HUC as the impacts.
- Generally locate projects on streams within one stream order as the impact streams.
- The ratio of urban to rural streams impacted should be generally replicated in project locations.
- All other factors being equal, priority should be given to 303(d) streams for which stream mitigation efforts may provide a means to alleviate the causes or sources of water quality and/or habitat impairment.

When evaluating a potential mitigation site, TSMP staff completes a habitat assessment based upon EPA's Rapid Bio-Assessment Protocol (RBP) as well as a morphological assessment to evaluate valley type, stream type, channel stability and channel evolution. These assessments help to determine if enhancement or restoration measures are necessary. A concept plan is then developed for landowner review. Participating landowners must be willing to convey a perpetual conservation easement. If the landowner agrees to the approach outlined in the concept plan and the required easement boundary, then a scope, fee estimate, and construction budget is developed for SMRT approval. Under the TSMP's streamlined procedures, the entire process from identification to construction can now be completed in one year.

Status of Current TSMP Projects

As of December 31, 2005, the TSMP had 10 SMRT approved projects that were in some phase of development or implementation. An overview of the status of each approved project can be found in Table 2. The following project descriptions provide site description, project scope and approach, estimated credits generated, and completion date for each approved project. For projects that have not yet been constructed, the credits generated and completion dates are estimates only. Actual dates and credits will be calculated upon completion of construction and as-built conditions survey.

Appendix A.

Project Descriptions

Cole Creek Stream Restoration Project

Tipton County, Tennessee



Watershed:

Loosahatchie River

Ecoregion:

Mississippi Valley Loess Plains

Project Length:

4,531 lf

Mitigation Treatment:

Restoration, Enhancement I

Credits Produced:

2,262

Completion Date:

February 2006

Project Description:

Cole Creek is a tributary to Royster Creek which in turn supplies Big Creek Canal, a 303d listed stream in Tipton and Shelby Counties. The project reach had previously been channelized for agricultural purposes and was deeply incised with high, vertical banks. Because of the channel incision, the floodplain was only accessible during extreme flood events. Livestock grazing and clearing for agriculture left little to no riparian buffer. This combination of factors resulted in severe streambank erosion, which in turn led to increased sedimentation and loss of habitat both within the project reach as well as downstream. The primary goals of the project included reestablishing stability, improving local water quality, and restoring aquatic and riparian habitat. The restored channel dimension and bankfull bench will provide access to a floodprone area which will reduce flood velocities and prevent excessive scour and erosion while the reduction in sediment inputs and the use of in-stream structures will improve aquatic habitat and maintain a diversity of bedforms. Likewise, the restored native buffer will filter and capture sediment and further improve both aquatic and terrestrial habitat.

Key Elements of Project:

- Priority 3 Restoration
- Stream Enhancement
- Existing culvert removal
- Bankfull bench, flood-prone area excavation
- Instream habitat structures
- Native riparian buffer establishment
- Livestock exclusion fencing
- Permanent Land Preservation Agreement



North Fork Mud Creek Stream Restoration Project

Carroll County, Tennessee



Watershed:

Lower Kentucky Reservoir

Ecoregion:

Southeastern Plains

Project Length:

14,850 lf

Mitigation Treatment:

Restoration, Enhancement I & II

Estimated Credits Produced:

9,637

Projected Completion Date:

December 2006

Project Description:

The project includes more than 14,000 linear feet of first and second order streams which comprise the majority of the headwaters for the North Fork of Mud Creek. Historical land management activities have included clearing associated with conversion to pastoral and agricultural uses and stream channelization. The existing channels are highly degraded due to past channelization, unrestricted livestock access, and riparian vegetation removal. Streambanks throughout the project area are characteristically vertical or near vertical with rotational slumping and mass wasting common. This bank instability is causing excessive sediment accumulation which is the main aquatic habitat-limiting factor. The lack of sufficient bank and riparian vegetation also limits the nutrient filtering, sediment and runoff retention, and habitat functions. The primary goals of the project included restoring stream stability, improving local water quality and enhancing aquatic and riparian habitat. Restoring a more natural channel dimension, pattern and planform and reconnecting to a functional floodplain will reduce flood velocities, more effectively transport sediments provided by the watershed, and reduce streambank erosion. The reduction in sediment inputs and the use of instream structures will improve aquatic habitat and maintain the diversity of the bedforms while the reestablishment of a native buffer will filter and capture sediment and further improve both aquatic and terrestrial habitat.

Key Elements of Project:

- Priority 2 Stream Restoration
- Stream Enhancement
- Instream habitat enhancement
- Native riparian buffer establishment
- Livestock exclusion fencing
- Perpetual Land Preservation Agreement



Yanahli WMA Stream Enhancement Project

Maury County, Tennessee



Unrestricted cattle access

Watershed:

Duck River

Ecoregion:

Interior Plateau

Project Length:

18,795 lf.

Mitigation Treatment:

Enhancement I

Credits Produced:

3,434

Completion Date:

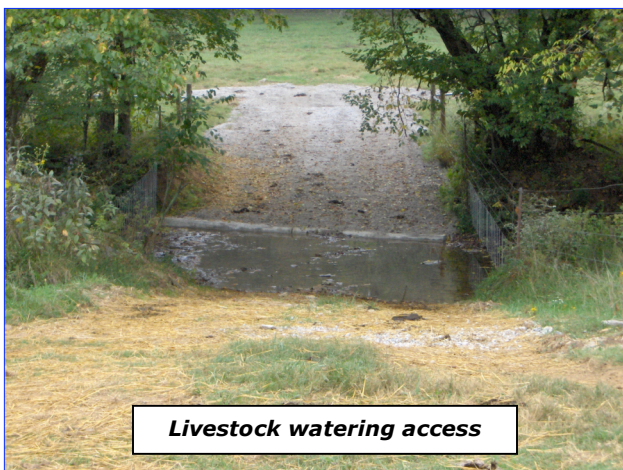
March 2005

Project Description:

The objectives of the project were to enhance the riparian community, and improve bank stability and in-stream habitat along five streams and several of their unnamed tributaries within the Yanahli Wildlife Management Area. The streams within the project area were relatively stable (bedrock) streams with significantly degraded riparian areas. Unrestricted cattle access over time resulted in moderately degraded in-stream habitat, bank instability, and degraded riparian buffers. Livestock exclusion fencing from the re-vegetated riparian areas was installed to prevent further degradation. In addition, several access ramps were installed to allow for continued livestock production practices. Goose Creek is 303(d) listed for habitat alteration.

Key Elements of Project:

- Riparian enhancement
- Livestock exclusion fencing
- Livestock access ramps created or enhanced
- Protective MOU



Livestock watering access



Exclusion fencing with trees

Turnbull Creek Stream Enhancement Project

Cheatham County, Tennessee



Watershed:
Harpeth River

Ecoregion:
Interior Plateau

Project Length:
4,430 lf.

Mitigation Treatment:
Enhancement II

Credits Produced:
1,476

Completion Date:
March 2005

Project Description:

Turnbull Creek at the project location was an entrenched, over-widened stream. Channel evolution resulting in the unstable channel most likely occurred as a response to the removal of riparian vegetation, unrestricted livestock access, and historic gravel dredging near the site. The unstable channel form resulted in accelerated bank erosion and decreased sediment transport capability. Project goals included establishing a new flood prone bench at the existing bankfull elevation at two locations, stabilizing the existing channel in place at one location, and enhancing the riparian buffer throughout the project reach. In-stream structures were incorporated to dissipate near-bank velocities and create in-stream habitat. The riparian area was enhanced through tree planting and protected from livestock using high-tensile fencing. The in-stream structures have dissipated near-bank velocities, encouraged deposition along the eroding bank, and improved in-stream habitat. Turnbull Creek was on the 303(d) list in 1998 for siltation.

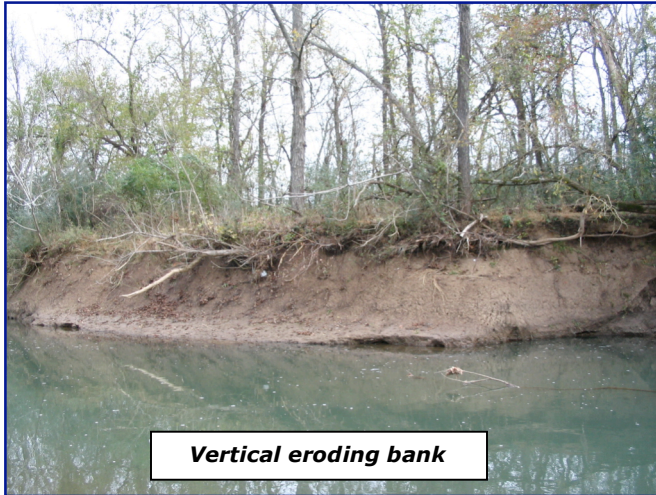
Key Elements of Project:

- Stream Enhancement
 - Bankfull bench, flood-prone area
 - Stream bank enhancement
 - In-stream habitat improvement
 - Native riparian buffer enhancement
 - Livestock exclusion fencing
- Perpetual Land Preservation Agreement



West Harpeth Stream Restoration Project

Williamson County, Tennessee



Vertical eroding bank

Watershed:
Harpeth River

Ecoregion:
Interior Plateau

Project Length:
15,850 lf.

Mitigation Treatments:
Restoration, Enhancement I,
Enhancement II

Estimated Credits Produced:
8,400

Estimated Completion Date:
March 2007

Project Description:

The West Harpeth River is 303(d) listed for E. coli, habitat alteration, nutrients, siltation, fecal coliforms, and low dissolved oxygen. The project reach was initially destabilized following realignment for road building near Highway 96 in the 1960's. Increased urbanization in the watershed and vegetation buffer management have also had an impact on channel morphology and bank stability. In 2002, a tornado hit the project area, which has had a considerable impact on downstream stability and the riparian community of the floodplain. The debris, which largely remains in the upper portion of the project reach, has caused significant bank instability and has allowed the channel to over-widen in places. The primary goal of the project is to restore a stable channel dimension to the West Harpeth River throughout the project reach. This will include bank excavation to correct the bank-full cross sectional area of the channel, stabilize vertical/unstable banks, and to reestablish a lower flood prone bench. In-stream structures will be constructed to improve in-stream habitat and reduce near bank shear stress in conjunction with the stabilization of banks and enhancement of the riparian community.

Key Elements of Project:

- Stream Restoration
 - Bankfull bench, flood-prone area
 - In-stream habitat enhancement
- Stream Enhancement
 - Native riparian buffer restoration
 - Livestock exclusion fencing
- Perpetual Land Preservation Agreement



Mid-channel bar forming

Sevenmile Creek Stream Enhancement Project

Davidson County, Tennessee



Vertical eroding bank

Watershed:
Cheatham Reservoir

Ecoregion:
Interior Plateau

Estimated Project Length:
3,900 lf.

Mitigation Treatment:
Enhancement II

Projected Credits Produced:
1,467

Projected Completion Date:
January 2007

Project Description:

The primary objectives of the project will be to stabilize channel banks; enhance the riparian zone through invasive species management and native re-vegetation; and create floodplain basins to filter flood flows and storm water from adjoining properties. Sevenmile Creek in the project area has increased runoff due to urban development, causing the stream to incise where possible and to widen. In-channel habitat in the project area is limited to localized irregularities in the limestone bed and exposed rock plates. Sevenmile Creek has been listed on the 303(d) list due to impacts from storm water discharges and hydro-modification. In addition, it provides habitat for the federally-listed Nashville Crayfish (*Orconectes shoupi*). Re-grading and planting of unstable banks will reduce erosion and improve water quality. The restored riparian buffer will decrease stream temperatures and provide habitat for terrestrial animals. The floodplain basins will help improve water quality, decrease peak flows in Sevenmile Creek, and provide valuable floodplain habitat.

Key Elements of Project:

- Stream Restoration
 - Bankfull bench, flood-prone area
 - In-stream habitat enhancement
- Stream Enhancement
 - Native riparian buffer enhancement
 - Invasive plant species control
- Perpetual Land Preservation Agreement



Nashville Crayfish

Beaver Creek Stream Enhancement Project

Knox County, Tennessee



Watershed:

Lower Clinch River

Ecoregion:

Ridge and Valley

Project Length:

14,435 lf.

Mitigation Treatment:

Enhancement I

Estimated Credits Produced:

1,631

Projected Completion Date:

March 2007

Project Description:

The Beaver Creek Stream Mitigation Site contains approximately 14,335 linear feet of riparian restoration and enhancement. The majority of Beaver Creek in the mitigation area has impacted riparian buffers which are highly degraded due to unrestricted livestock access and riparian vegetation removal and/or continuous maintenance. Beaver Creek is impaired due to both organic enrichment and pathogens. The resulting impacts are attributable to unrestricted cattle access to the stream and the absence of riparian and bank vegetation. The lack of sufficient bank-stabilizing riparian vegetation also limits nutrient filtering, sediment and runoff retention, and habitat functions provided by a mosaic of native bottomland hardwood forested buffers. The enhancement treatments will ensure improvement to the overall health of the stream, improve localized water quality, provide habitat and shade to the river for the long term. Riparian restoration/enhancement areas will be reforested through native tree and shrub planting and fence will be constructed to permanently exclude livestock, mechanized land-clearing, mowing, bush-hogging or other maintenance. Alternative watering systems will be constructed to provide landowners with a reliable source of water for their cattle.

Key Elements of Project:

- Stream Enhancement
- Livestock Exclusion
- Native Riparian Buffer Establishment
- Perpetual Land Preservation Agreements



Kyle's Ford Stream Restoration Project

Hancock County, Tennessee



Watershed:
Upper Clinch River

Ecoregion:
Ridge and Valley

Project Length:
18,150 lf.

Mitigation Treatment:
Restoration, Enhancement I,
Enhancement II

Estimated Credits Produced:
5,398

Projected Completion Date:
March 2007

Project Description:

The Clinch River System provides habitat for 48 imperiled and vulnerable species, including 10 species of mussels and fish listed by the USFWS as threatened or endangered near the project area. The health of the Clinch River in general is threatened by the erosion of river banks, the loss of riparian vegetation, and declining water quality due to contamination from mining, industrial and agricultural activities. The ultimate goals of this project are to restore stability to the stream systems on the property and re-establish in-stream and near-stream habitat through channel and riparian restoration. These activities will reduce sediment entering the Clinch River system by establishing stable stream dimensions, patterns, and profiles to help maintain the sensitive ecosystem. Stream bank enhancement areas will improve bank stability, reduce excessive erosion and attenuate point source sediment from entering the Clinch River onsite. Planting native trees and shrubs and seeding with native herbaceous vegetation will establish a forest riparian buffer community along the Clinch that has been absent for decades.

Key Elements of Project:

- Stream Channel Restoration
- Stream Bank Enhancement
- Bankfull bench, flood-prone area excavation
- In-stream habitat enhancement
- Riparian Restoration
- Protective MOU



Marble Springs Stream Restoration Project

Knox County, Tennessee



Watershed:

Fort Loudon Tennessee River

Ecoregion:

Ridge and Valley

Project Length:

3,022 lf.

Mitigation Treatment:

Stream Channel Restoration

Estimated Credits Produced:

2,050

Projected Completion Date:

March 2007

Project Description:

The Marble Springs Stream Restoration Project contains approximately 3,022 linear feet of stream channel restoration, riparian restoration, channel relocation and in-stream habitat enhancement. Project objectives include restoring Neubert Springs and one unnamed tributary to a referenced, stable morphologic dimension, pattern and profile and reforest the cleared riparian corridor. Stream channel restoration activities will involve reconstructing the existing channel in its original floodplain location, reshaping stream banks, installing natural grade control structures, installing log vanes, log sills, step structures, cross vanes, or other necessary natural materials deemed appropriate to reduce bed and bank erosion. Riparian and stream bank restoration areas will be reforested through native tree and shrub planting, live staking and permanently excluding mechanized land-clearing, mowing, bush-hogging or other maintenance.

Key Elements of Project:

- Stream Channel Restoration
- Riparian Restoration
- New channel construction
- In-stream habitat enhancement
- Native riparian buffer establishment
- Perpetual Land Preservation Agreement



Third Creek Stream Restoration Project

Knox County, Tennessee



Watershed:

Fort Loudon Tennessee River

Ecoregion:

Ridge and Valley

Project Length:

7,602 lf.

Mitigation Treatment:

Stream Restoration

Estimated Credits Produced:

5,092

Projected Completion Date:

March 2007

Project Description:

The Third Creek Stream Restoration Project contains approximately 7,602 linear feet of stream channel restoration, riparian restoration, channel relocation and in-stream enhancement. Project objectives include restoring Third Creek and one unnamed tributary to a referenced, stable morphologic dimension, pattern and profile and improving in-stream and riparian habitat. The project reaches of Third Creek and the unnamed tributary are impaired due primarily, to high-energy erosive flows during storm events, historic channel alteration, excessive nutrient loading, and impacts to riparian buffers. As a result of channel instability and lack of appropriate stream pattern, aquatic and riparian habitat functions have also been impaired. Stream channel restoration activities will include reconstructing a new channel in the floodplain, reshaping stream banks, installing natural bank protective structures, installing log vanes or rock vanes, or other necessary natural materials deemed appropriate to reduce bed and bank erosion. Riparian restoration measures will be implemented on the newly constructed channel and consist of invasive species removal and seeding and planting native herbaceous and bottomland hardwood trees.

Key Elements of Project:

- Stream Channel Restoration
- Riparian Restoration
- Invasive Species Removal
- In-stream habitat enhancement
- Native riparian buffer establishment
- Perpetual Land Preservation Agreements



Figures and Tables

- Figure 1. Mitigation Projects Map
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Figure 1.

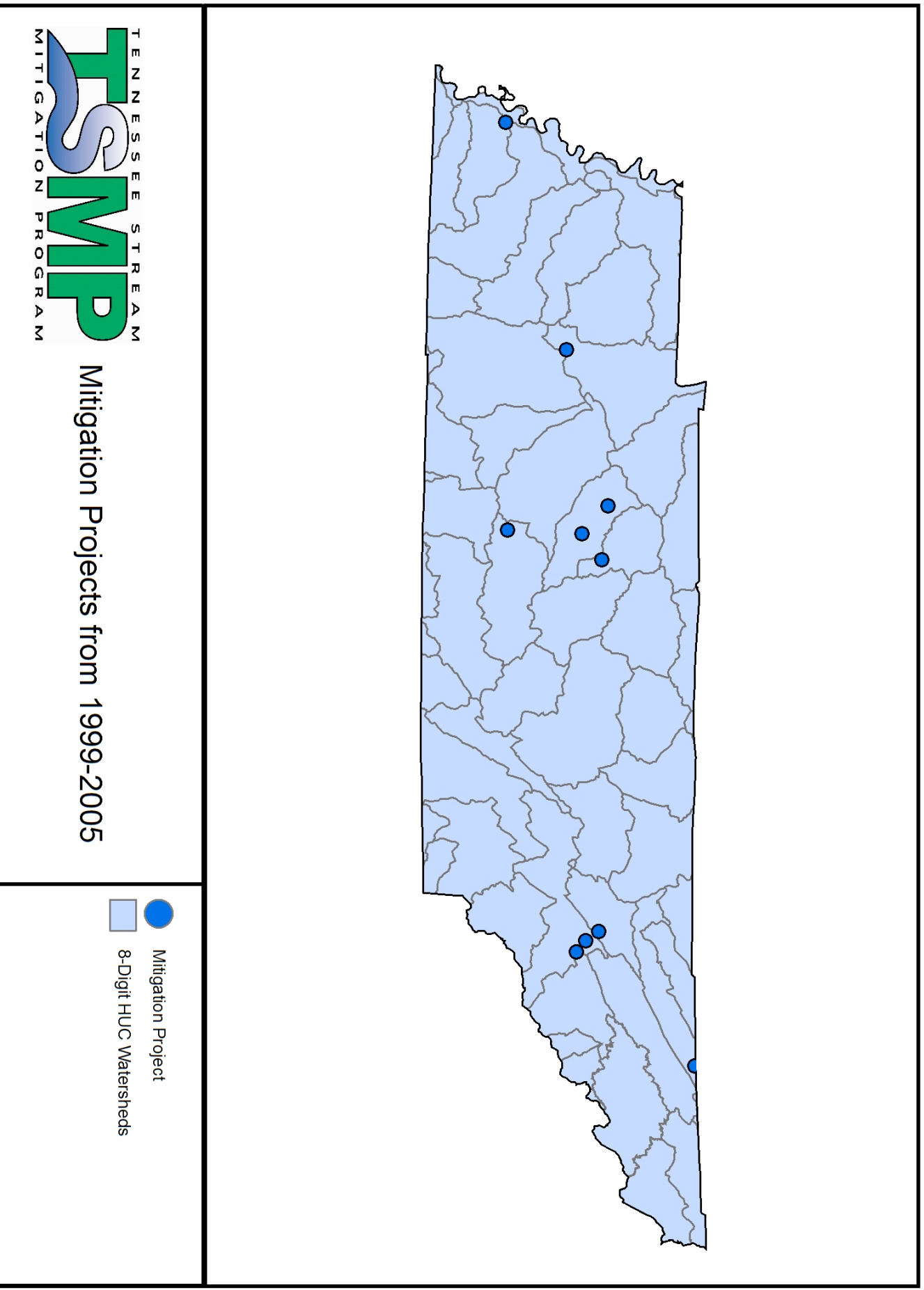
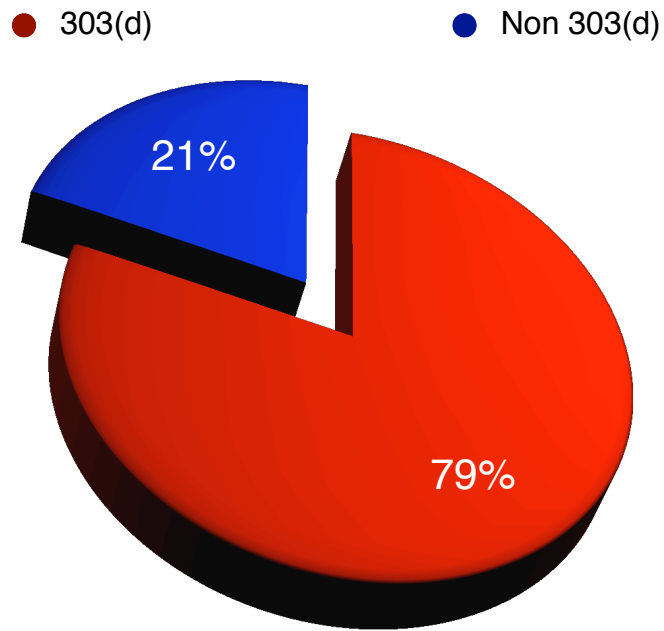
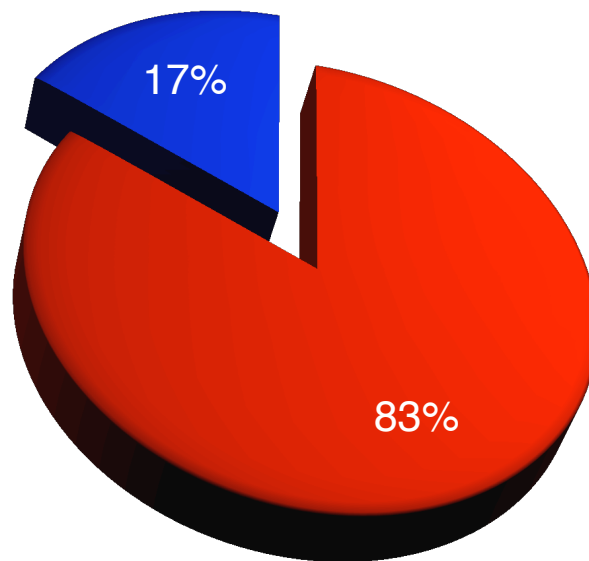


Figure 2.



Linear Feet



Mitigation Credit

Figure 3.

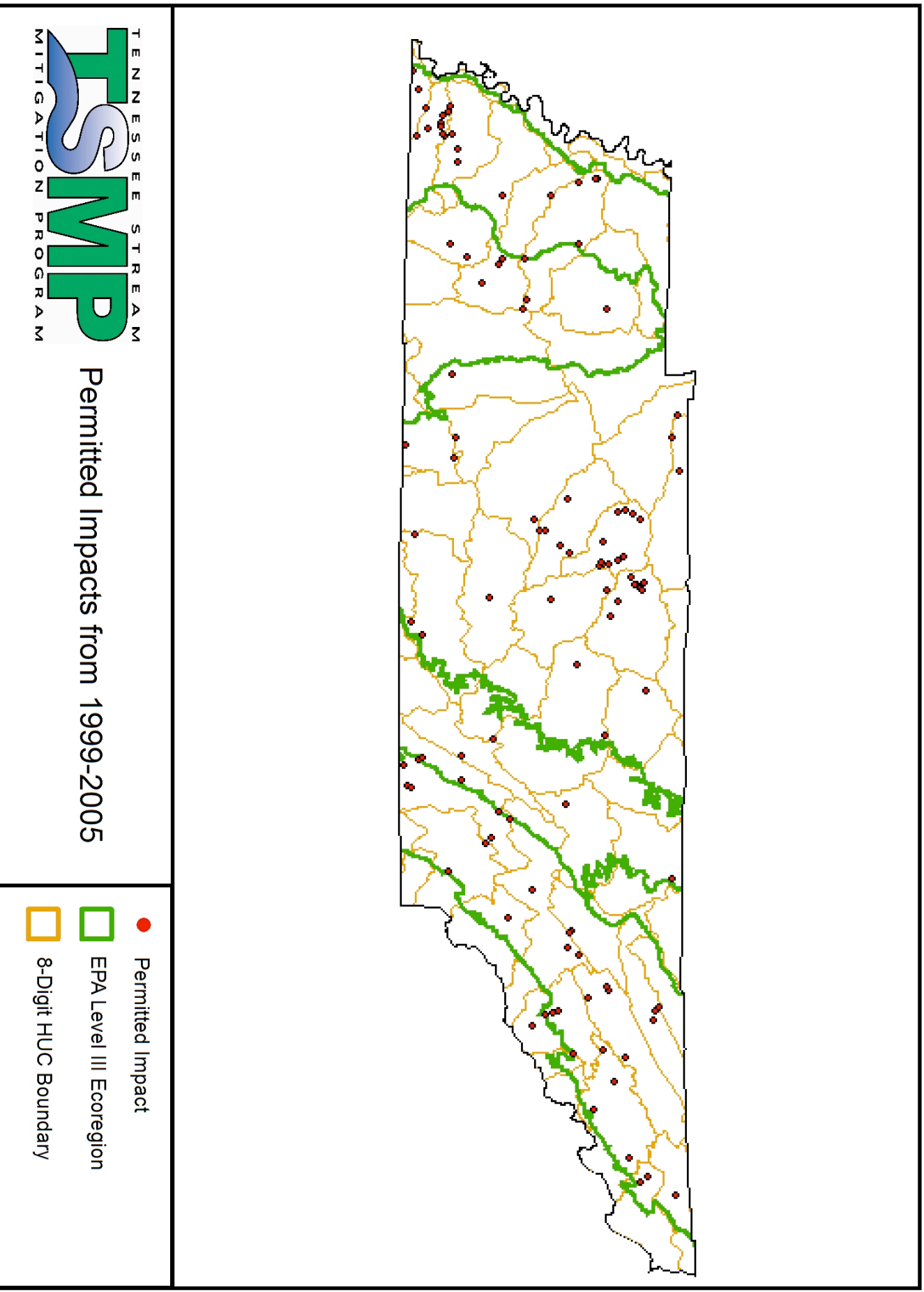


Figure 4.

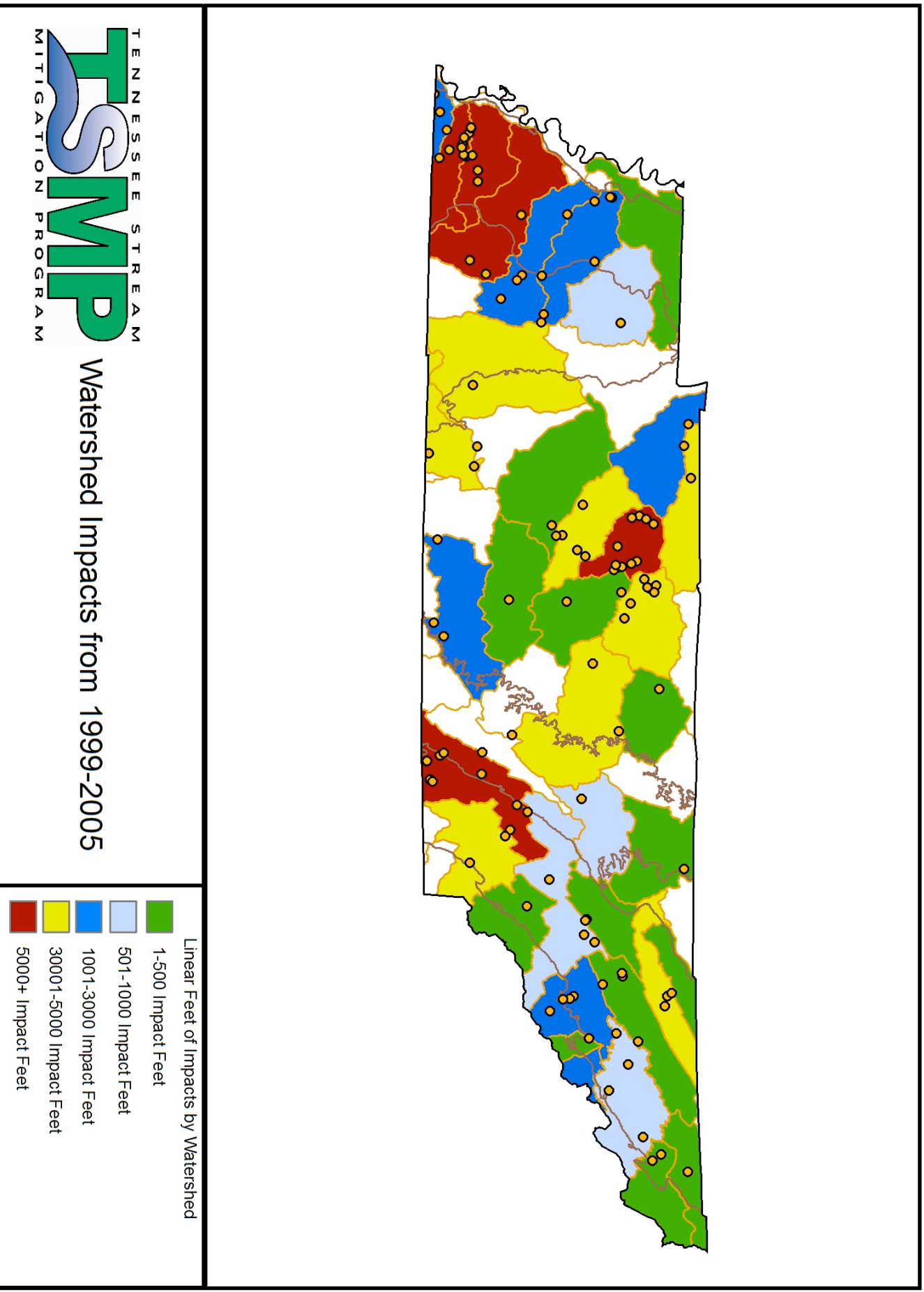


Table 1.

Project Name	Total Expenditures
Cole Creek Restoration Project	\$349,251.37
North Fork Mud Creek Restoration Project	\$5,704.00
West Harpeth River Restoration Project	\$177,582.80
Yanahli Enhancement Project	\$131,655.54
Turnbull Creek Enhancement Project	\$269,459.39
Sevenmile Creek Enhancement Project	\$49,378.50
Marble Springs Restoration Project	\$58,331.51
Kyles Ford Restoration Project	\$85,171.28
Third Creek Restoration Project	\$61,000.00
Beaver Creek Enhancement Project	
Total	\$1,187,534.39

Table 2.

Project	8-Digit HUC	Estimated Cost	SMRT Approval Date	Treatment Type(s)	Project Length (LF)	Proposed Credit	Design Status	Construction Complete
Cole Creek	08010209	\$429,513.21	November 2004	Restoration, Enhancement I	4,531	2,262	Complete	December 2005
NF Mud Creek	06040005	\$1,387,560.00	May 2005	Restoration, Enhancement I & II	14,850	9,637	In Design	December 2006
West Harpeth River	05130204	\$1,709,000.00	May 2005	Restoration, Enhancement I	15,850	8,400	In Design	March 2007
Yanahli WMA	06040002	\$131,655.54	November 2004	Enhancement I	18,795	3,434	Complete	March 2005
Turnbull Creek	05130204	\$269,459.39	November 2004	Enhancement II	4,430	1,476	Complete	March 2005
Sevenmile Creek	05130202	\$274,668.00	November 2004	Enhancement II	3,900	1,300	In Design	December 2006
Marble Springs	06010201	\$450,722.06	May 2005	Restoration	2,950	2,050	In Design	September 2006
Kyle's Ford	06010205	\$674,786.00	May 2005	Restoration, Enhancement I & II	18,150	5,398	In Design	December 2006
Third Creek	06010201	\$1,055,000.00	May 2005	Restoration	7,602	5,068	In Design	December 2006
Beaver Creek	06010207	\$91,636.00	May 2005	Enhancement I	14,335	1,631	In Design	November 2006
		\$6,474,000.20			105,393	40,656		

All information presented is accurate as of December 31, 2005

